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My view of the project status

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14 April 2015

See slides that look like this:

PIP-II (Proton Improvement Plan–II)

The PIP-II goal is to support long-term physics research goals by providing increased beam power to LBNF, while providing a platform for the future

- Design Criteria (unchanged in last 18 months)
  - Deliver >1 MW of proton beam power from the Main Injector over the energy range 60 – 120 GeV, at the start of LBNF operations
  - Support the current 8 GeV program including Mu2e, g-2, and short-baseline neutrinos
  - Provide an upgrade path for Mu2e
  - Provide a platform for extension of beam power to LBNF to >2 MW
  - Provide a platform for extension of capability to high duty factor/higher beam power operations
  - At an affordable cost to DOE
- Goal: Initiate operations in newly-configured complex in ~2024

Fermilab

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or this:

PIP-II Project Status and Strategy

- PIP-II is in the development phase and is not yet recognized as a formal DOE project
  - However, PIP-II has received very strong support from P5, DOE/OHEP, and the Fermilab director
  - Expect formalization of project status (CD-0) in the next ~year, followed by ~8-year development + construction period
- Goals for FY2015
  - Release PIP-II Reference Design Report
  - Update current cost estimate as necessary
  - Start developing a resource loaded schedule
  - Receive RFQ (from LBNL) and initiate commissioning at PXIE
  - Keep HWR and SSR1 fabrication on schedule
  - Develop deliverables strategy with India (and Europe)
  - Support DOE/OHEP in development of Mission Needs Statement
  - Establish PIP-II Office

Two areas of focus:

- the “Project”
  - management and moving it through the DOE system

- the “Technical”
  - R&D program
    - @PXIE
    - SRF
    - Collaboration

But what is going on?

- Getting to CD-0
  - "A Mission Need Statement is the translation of this gap into functional requirements that cannot be met through other than material means. It should describe the general parameters of the project, how it fits within the mission of the Program, and why it is critical to the overall accomplishment of the Department mission, including the benefits to be realized. The mission need is independent of a particular solution, and should not be defined by equipment, facility, technological solution, or physical end-item. This approach allows the Program the flexibility to explore a variety of solutions and not limit potential solutions."
  - "Approve Mission Need Statement"
    - Pre-Conceptual Planning Activities
    - Mission Validation Independent Review
    - Conduct an Independent Cost Review (ICR) for a Major System Project (>$750M)
  - Have a scheduled review date: June 16/17
    - Steve H is working with Steve Peggs on the charge and scope

But what is going on?

- 800 MeV superconducting linac and mods to complex to support it
  - $651M price tag that we gave to P5 ~1 year ago
    - $400M for the linac
      - ion source through the transfer line into Booster enclosure
      - enclosure, gallery
      - cryo support
    - $30M AIPs for the Booster/MI/RR
      - injection, RF, dampers, γ_t jump, 20 Hz
    - $61M GARD/SRF/SRF ops & Infrastructure
    - $160M In-Kind Contributions
      - India is the dominant partner
  - Total Project Cost starts accumulating at CD-0

profiles

	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	Total
PIP II Funding Profile (Cost to DOE)	23.4	28.5	39.5	44.8	61.9	79.0	80.0	75.0	59.0	491.1
In-kind international contributions (India, CERN)	0.3	1.1	1.9	17.5	37.7	39.5	39.2	23.0	-	160.3

- As presented to P5 and DOE OHEP last fall
- FY15: $19.8M

- FY16 Guidance: $19.5M
- FY17 Guidance: $17.5M
  - Fermilab-OHEP Budget Briefing asked for $31.5M
    - 75 FTE + $10M M&S
    - Steve said this would retain possibility of FY19 construction start (barely)
    - No overwhelming support evident

What's going on with India?

- India wants to build **2** high intensity proton linacs
  - a spallation neutron source at RRCAT (Indore)
  - a 1 GeV, 10-30 mA ADS at BARC (Mumbai)
- Follow the same design as FNAL
  - frequency, energy transitions, etc
  - Want to learn the design and fabrication techniques for SRF

- High level documents allot ~$200M to the collaboration
  - contributions to PIP-II
  - in 2 phases
    - R&D phase: ends in 2018
    - Construction phase: continue if both countries agree
      - dependent upon meeting the R&D deliverables !
  - **In discussion to fund CW cryoplant**
    - with a well defined procurement plan!

why Shekhar has been pushing on the definitions!

Organization

- Post CD-0:
  - Submit request for PED funds(to be used post CD-1)
  - Proceed with Conceptual Design
  - Start monthly PARS-II reporting (financials)
  - Start Monthly or Quarterly Project Reporting

Think of the TeamCenter quarterly reports!

Placed in PIP-II Department

Moving to IARC in summer

- Building a Project Office
  - Project Manager: Steve Holmes
  - Project Engineer: Don Mitchell
  - Project Scientist: Valeri Lebedev
  - Deputy PM Construction Coordinator: Shekhar Mishra
  - Deputy PM Accelerator Integration: Paul Derwent
  - **Associate PM Planning & Reporting: opening**
  - Associate PM Civil Construction: TBD
  - Associate PM ESH&Q: TBD
  - Financial Officer: Chris Jacobsen
  - Procurement Manager: TBD
  - AIP Manager: TBD
  - Project Controls Manager: TBD

For CD-1: Some of the things we have to do…

- Develop a Risk Management Plan
  - cost, schedule, technical, safety
- Complete a Conceptual Design Review & Report
  - building on the RDR
- Prepare a Preliminary Hazard Analysis Report
  - Fernanda has been working on a summary document for PXIE operation
  - Hazard analysis form (as used by g-2 and Mu2e)

R&D Program: all in preparation for CD-2/3

- mitigate technical and cost risks,
  - by validating the choices made in the PIP-II facility design
    - Technical risk: impair the ability to meet fundamental performance goals
      - PXIE: ion source + RFQ + HWR + SSR1
      - SRF: spokes + ellipticals
      - LLRF: LFD & resonance control
      - RF power:
  - by establishing fabrication methods for major sub-systems and components including the qualification of suppliers
    - Cost/Schedule risk: compromise the ability to meet currently understood cost or schedule goals
- complete in 2018 for 2019 construction start

5 primary areas to address risk (my P2MAC talk in March)

1. Development and integrated systems testing of PIP-II Front End components (PXIE);
2. Development of a Booster injection system design capable of accepting extended beam pulses from the PIP-II linac ;
3. Development and demonstration of cost effective superconducting radio frequency acceleration systems at four different frequencies and with rf duty factors ranging from 10% to 100%;
4. Development of systems designs capable of supporting a 50% increase in the proton beam intensity accelerated and extracted from the Booster/Recycler/Main Injector complex;
5. Development of requisite capabilities at international partner institutions to successfully contribute to PIP-II construction.

what's next in the 'project'?

- CD-0 Mission Needs Document
  - DOE writes the document, not us
  - not a technology choice
  - " The mission need is independent of a particular solution, and should not be defined by equipment, facility, technological solution, or physical end-item"
- present a cost range (0.5x - 2x)
  - cost estimate? is this a "Major System Project"? >750 M$?
  - changes review process and who has critical decision authority (e.g., the Secretarial Acquisition Executive or the Under Secretary)
- between CD-0 and CD-1 it is up to us to investigate alternatives
- CD-1 ("Approve Alternative Selection and Cost Range")
  - "CD-1 approval marks the completion of the project Definition Phase, during which time the conceptual design is developed. This is an iterative process to define, analyze, and refine project concepts and alternatives. This process uses a systems methodology that integrates requirements analysis, risk identification and analysis, acquisition strategies, and concept exploration to evolve a cost-effective, preferred solution to meet a mission need."
  - Conceptual Design Report
  - Design Review of the Conceptual Design
  - and a whole bunch more Project Management (16 separate documents and plans)

Summary

- CD-0 Review in June!

- Working on setting up much of the ‘project’ infrastructure
  - Project Office
  - Reporting
  - Documentation

- R&D plan:
  - PXIE + SRF
  - India Institutes Fermilab Collaboration

- Backups

what are the other project steps?

- CD-1: Approve Alternative Selection and Cost Range
  - Conceptual Design
- CD-2: Approve Performance Baseline
  - Technical Design
  - Total Project Cost, Schedule, Performance Parameters are set
- CD-3: Approve Start of Construction
  - End of R&D
  - Spending construction funds
- CD-4: Approve Start of Operations or Project Completion